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Effect of aeration flow rate on the growth of microalgae as a biofuel feedstock and wastewater treatment

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The objectives of this study is to evaluate the effect of aeration inlet gas flow rate on the growth of microalgae as a sustainable biofuel feedstock and also the use of these cultured microalgae as a means of biological nutrient removal medium in wastewater. The natural lagoon water from the New Nicosia membrane bioreactor WWTP containing microalgae was inoculated at 5% ($V_{inoculation}/V_{media}$) in 2000 mL BG 11 culture medium and was placed under Esco Class II Biosafety Cabinet photobioreactor in the laboratory and was supplied with different levels of aeration, under continuous illumination of white fluorescent light of 45-50µmol photon $m^{-2}s^{-1}$ for two weeks, afterwards the microalgae from the BG 11 was adjusted to an absorbance of 1.5 and further innoculated to treat wastewater collected from fine screen chambers of New Nicosia membrane bioreactor WWTP. The final biomass yield of trial II (4.5 L/Min aeration flow rate) culture media with value of 0.605 g/L was higher than trial I (9.0 L/Min aeration flow rate) and III (without aeration) with values of 0.418 g/L and 0.207 g/L respectively. The final Chlorophyll α content of the microalgae cultivated in trial II was higher with value of 2.450 µg/mL than trial I and III with values of 0.906 µg/mL and 0.903 µg/mL respectively. The concentration of total nitrogen and phosphorus from the fine screen chamber wastewater of NNMBRWWTP was reduced 105.909 mgN/L to 1.847 mgN/L and 6.442 mg P/L to 0.932 mg P/L respectively, with microalgae dry biomass yield value of 1.284 g/L and the nitrogen and phosphorus removal efficiency was 98.256% and 83.078 % respectively over 5 days. From the result gotten from the study, we could say that aeration culture media with 4.5 L/Min was better, since it increase the growth rate of microalgae which is therefore suitable for biofuel production and also microalgae could be used as a secondary treatment for wastewater containing high nutrient from the research resulted reported.

Biography

Harrison Onome Tighiri, holds a B.Sc. in Fisheries and Aquaculture technology from Delta State University, Nigeria (class of 2012) and a M.Sc. in Environmental Science from Cyprus International University, KKTC, Turkey (class of 2015). He is actively involve in Microlagae biofuel production, wastewater treatment, Biomass scenario modeling, life cycle analysis research, he has also won several academic and research awards and currectly looking forward to start his PhD.

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